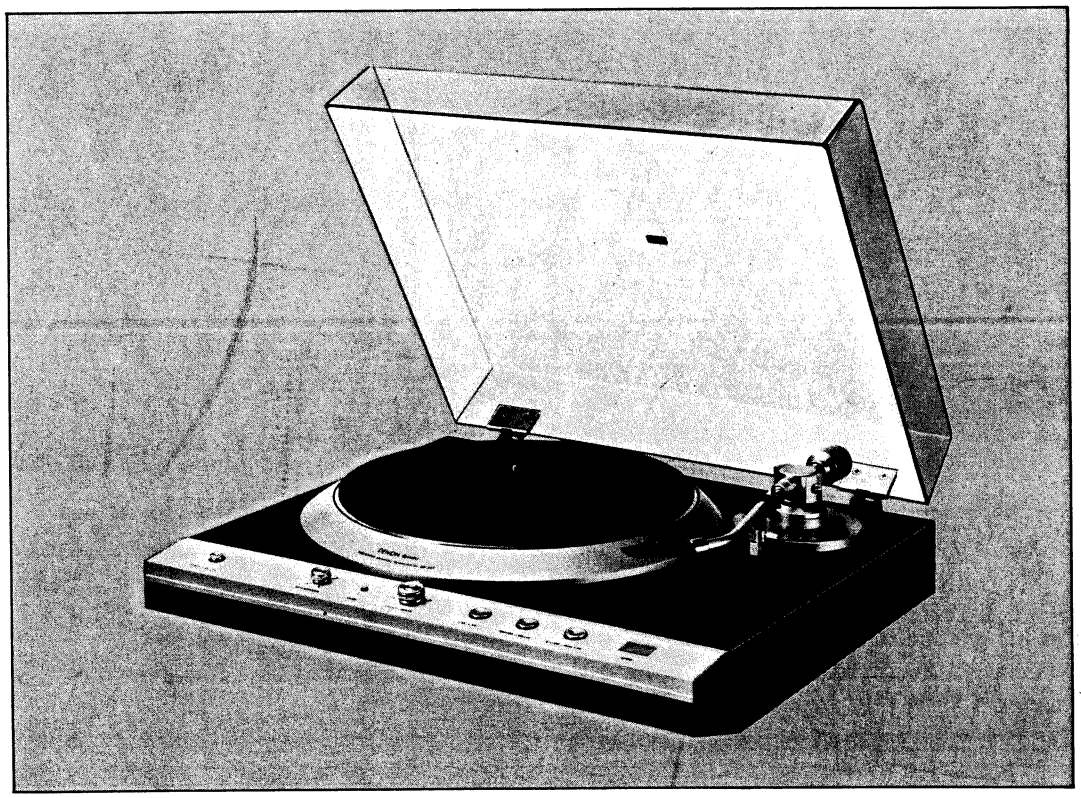
DENON

Hi-Fi Component Record Player

SERVICE MANUAL

SERVO-CONTROLLED DIRECT DRIVE AUTOMATIC RECORD PLAYER

MODEL DP-40F SERIES



Model DP-40F

NIPPON COLUMBIA CO., LTD.

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SAFETY PRECAUTIONS

Model DP-40F is designed and manufactured with careful consideration about product safety. For continued production safety, read following precautions and practice proper servicing.

1. Since the printed circuit borad of 120V version of Model DP-40F have high voltage potential from the metal chassis regardless of the polarity of the AC supply, use an isolating transformer (1:1) for servivcing.
2. Replace always with correct parts having correct rating, shape and material, etc. Especially the component with shading and ⚠ mark must be replaced only by the specified component for safety reasons.
3. For setting up the record player;
   A) Do not damage the power cord by placing a heavy object on it, or by pinching it between angular objects. Do not fix the power cord by nails, etc. on wall.
   B) Make sure any metal objects such as needle, hair pin or coin are not remaining inside the appliance.
   C) Give sufficient clearance for ventilation holes at bottom. Allow more than 10cm clearance between the rear of cabinet and wall.

THEORY OF OPERATION

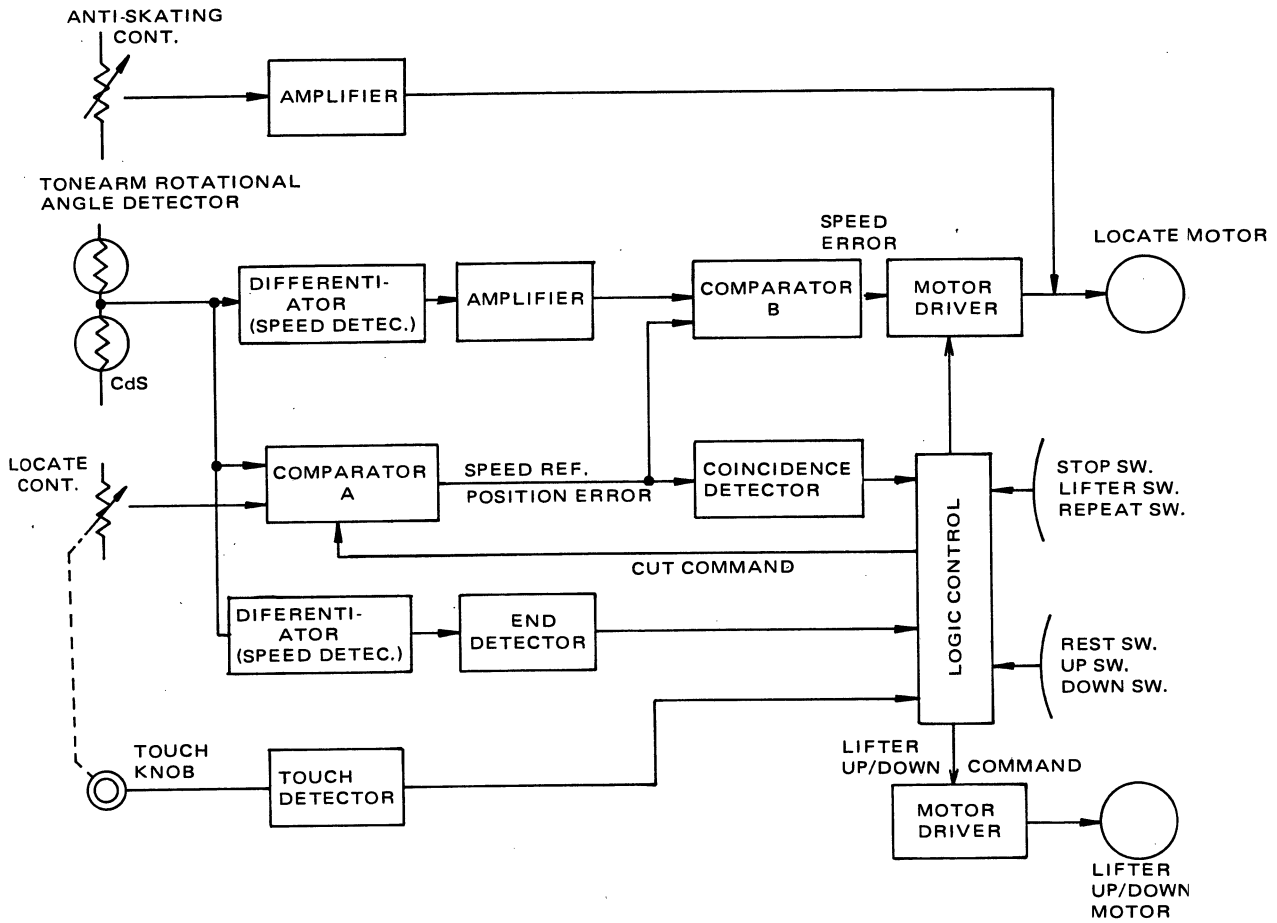


Fig. 1 Block diagram of tonearm control of DP-40F

Control of Auto-arm Motion

Block diagram of tonearm control circuit is shown in Fig. 1. As shown therin, the auto-arm control fuctions in accordance with various signals from the logic circuit defined by the functional state of the tonearm and the selection of operational mode.

In this chapter, the principle of servo control of tonearm is mainly explained. Assumption is made that the locate knob has been set to a position within 30cm diam. of a record. When the locate knob (being a touch sensor) is touched by hand, Comparator A compares the tonearm position signal and the preset locate signal. At this time, the comparator judges if the tonearm is inside of the preset position or outside of it. The output is a speed reference signal for moving the tonearm outward or inward depending on whether the tonearm is inside or outside of the preset position respectively.

Comparator B compares this speed reference signal with the signal proportional to the rotational speed of tonearm as a result of differentiating the tonearm position signal, or the detected speed signal. If this detected speed signal becomes over or under the speed reference signal, a speed error signal is generated at the output for feeding into the motor driver. Thus the servo loop functions so as to maintain a constant speed of tonarm.

As the tonarm reaches the preset locate position, the output of Comparator A becomes zero, ie, the speed reference signal becomes zero. (Since the positonal error signal is zero, it means the tonearm position coincides the preset position by the locate knob.) Accordingly, the rotation of tonearm rapidly decreases and finally stops, resulting in zero output of the speed signal. The positional servo control is thus accomplished to define the tonearm position.

If the locate knob is turned again, the preset position is shifted. The tonearm moves again toward the newly ordered position.

If the locate knob is touched by hand during playback, the tonearm is lifted, and is returned to the preset locate position by command of the logic circuit. This function enables partial repeat of same music (desired band) as many times as touched. The servo controlled non-contact type Auto-arm mechanism has an extremely unique feature for such a new way of utiliztion.

Tonearm Drive Motor and Lifter Drive Motor

The locate motor affixed on the tonearm pivot consists of a coil as rotor and a magnet as stator. The reason is explained below:

If inversely, the coil is for the rotor and the magnet for the stator, there will be various drawbacks. That is; there are ferrous plates and levers near the magnet introducing irregular force on the tonearm pivot. In an extreme case, the tonearm may be turned, or not as severe as that, but horizontal sensitivity of tonearm will be impaired. Anyway, irregularity is so great that the anti-skating compensation would be out of question; furthermore, as the magnet rotates, the magnetic flux flows across the output signal leads of cartridge, possibly resulting in a voltage generation

of noise.
To solve these problems, the DENON Auto-arm has the construction discribed before. Full performance of high sensitivity tonearm without deteriorating S/N ratio is thus assured.
The exclusive arm lifter motor has a rotor magnet and a stator coil since it causes no problem.

Main Blocks of Circuit

1. Memory circuits

Two memory circuits are provided for tonearm motion. One is for sustaining the locate signal (LCT signal) during locate motion (during the time the tonearm moves from start until preset position). The other memory circuit is to memorize signal (CUT signal) for ejecting automatic function at any moment and returning the tonearm to the arm rest. The former memory circuit is indicated as "LCT_{FF}" and the latter "CUT_{FF}" in the schematic diagram. Both of them consist of a flip-flop of cross-connected NAND gates as shown in Fig. 2. It is a set-reset flip-flop with Gate A for set and Gate B for reset.

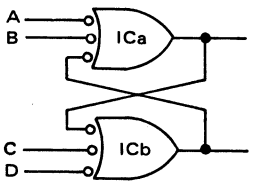


Fig. 2 Memory Flip-Flop

2. Coincidence detector of tonearm position

When the tonearm comes at the ordered position (at preset locate position or at arm rest) by servo control, 0V (Actually set to −0.3V because of offset voltage) is obtained at Pin ① of IC2. If the tonearm is outside of the ordered position, the tonearm is driven toward inside by the start signal. At this time, voltage at Pin ① of IC2 increases toward 0V from large negative voltage. If the tonearm is inside of the ordered position, it functions vice-versa. The coincidence detector is so arranged that it provides 0V only when the output of Pin ① of IC2 crosses 0V point. Other times whether for positive or negative inputs, only positive output is derived. See Fig. 3.

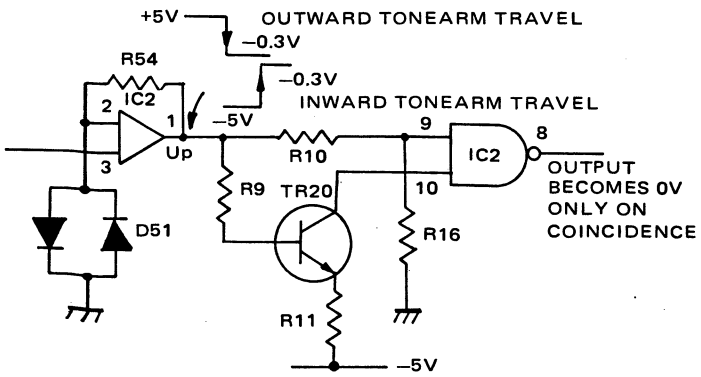


Fig. 3 Coincidence detector

3. Delay circuit for coincidence signal

The tonearm travel stops when it reaches the ordered position, either the preset locate position or the arm rest. As discribed earlier, when the tonearm reaches the above position, the coincidence signal is provided. Accordingly, Pin ⑪ of IC5 becomes high level which is in turn fed into Pin ⑩ of IC5 in Fig. 4. However, by TR3 and the capacitor C2 at its base, charging voltage (base voltage of TR3) gradually increases in a time determined by the time constant of the circuit. If the coincidence signal is sustained for a certain period of time, the emitter voltage of TR3 reaches high level and after that, a signal is obtained at Pin ⑧ of IC5 indicating that the tonearm position coincides the ordered position. By this signal, both memory circuits, LCT_{FF} and CUT_{FF} is simultaneously reset for descending the tonearm and the automatic function is completed.

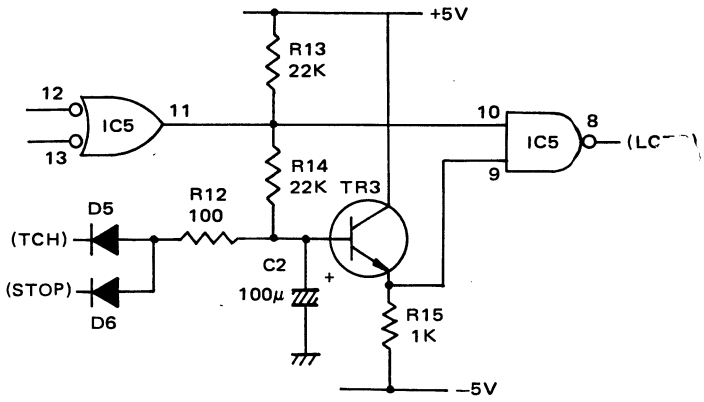


Fig. 4 Delay circuit for coincidence signal

ADJUSTMENT

Inside Mechanism Section

1. Micro switch position (up switch and down switch)

1-1. Remove the arm clamper at the arm rest.

1-2. Manually turn the white cam ⑮ in Fig. 8 counter-clockwise until it stops.

1-3. Adjust position of the up switch SW2 (with rollered actuator ⑯ in Fig. 8) so that the roller fits in the dent of the cam and the normally contact (N.C.) terminal makes contact with the common terminal.

1-4. Manually turn the white cam clockwise until it stops. (Make sure, at this time that the above rollered actuator of the up switch SW2 is pressed by the cam and the normally open (N.O.) terminal makes contact with the common terminal.)

1-5. In this state, adjust position of the down switch SW3 (㉑ in Fig. 8) so that its actuator is pressed and the N.O. terminal makes contact.

1-6. After the above adjustment, turn on the power and operate the lifter button and let the lifter motor up and down. Make sure that the N.C. terminal of up switch SW2 makes contact at lifted up position, and the N.O. terminal of down switch SW3 makes contact at down position.

2. Rest switch SW1 position

While the tonearm is returned to the arm rest, adjust the fixing position of the rest reed switch SW1 (③in Fig. 8) to make contact.

Electrical Section

1. Offset adjustment (KU-318/KU-321)

1-1. Obtain zero blance of tonearm. Then, while touching the locate knob by hand, turn it to locate the tonearm to an optional position (about outside of 30cm).

1-2. Adjust VR1 so that the voltage at CN-5 ②of TP-1 on the tonearm servo control P.W. board (KU-318/321) becomes −0.3V when the tonearm stops (coincides the locate position). (Be sure to keep touching the locate knob during adjustment. The ground terminal is CN-5 ④of TP-1.)

2. Record-end detection (KU-318/KU-321)

With the lifter button at up mode, set the stylus position at 60 mm radius from the center shaft and adjust VR2 so that the voltage at CN-5 ③ of TP-3 on the tonearm servo control P.W. board (KU-318/321) becomes −3.5±0.2V.

3. Locate knob position (KU-318/KU-321)

Insert the locate knob so that the dot comes at around the center of the VR. Turn the knob to align the dot with 30cm indication.

While touching the locate knob, adjust VR3 so that the stylus point comes on the lead-in position of 30cm LP record.

4. Phase adjustment of turntable control (KU-317/ KU-320)

Connect the probe and ground of an oscilloscope to TP ③ and TP ① of the turntable servo control P.W. board (KU-317/320) respectively.

Observe waveform and adjust VR1 for 33rpm and VR2 for 45rpm so that the waveform becomes as shown in Fig. 5.

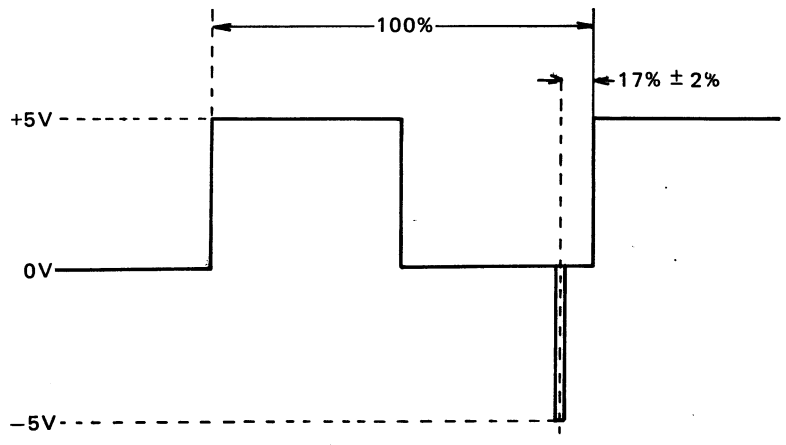


Fig. 5 Synchronized waveform

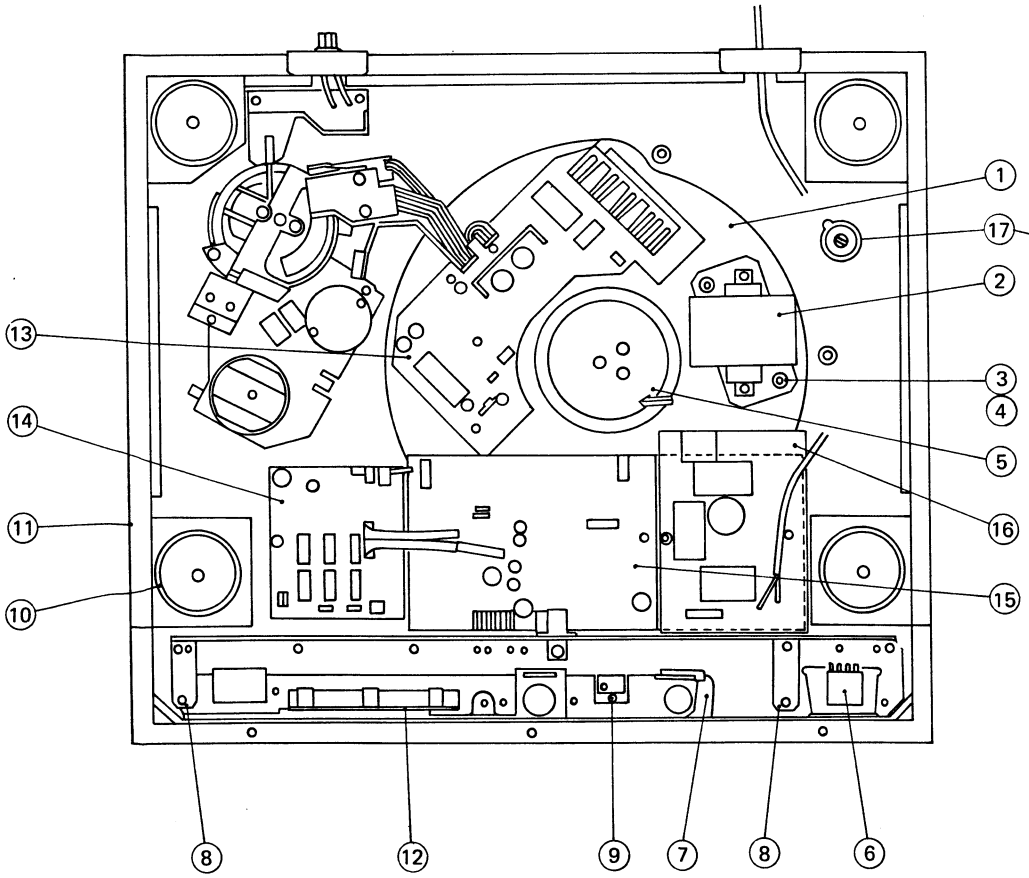
PARTS LIST FOR MODEL DP-40F SERIES

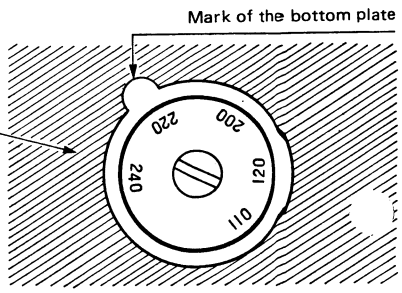
MAIN CONSTRUCTION

Ref. No.	Part No.	Part Name	Remarks
	4218123005	RECORDED TURNTABLE	
1	4118032306	MOTOR CHASSIS	
	1468065107	FRAME	
2	⚠2339020209	POWER TRANS FMR 120V	
	⚠2339023002	POWER TRANS FMR 200V ~ 240V	
	⚠2334029108	POWER TRANS FMR MULTI SPLY★	
3	129801005	CUSHION RUBBER	
4	4438156108	SPACER	
5	⚠2178028404	MOTOR ASSY 200V~240V MULTI SPLY★	
	⚠2178036108	MOTOR ASSY 120V	
	3918423006	MAGNETIC HEAD	
6	⚠2129039002	PUSH (POWER) SWITCH 120V	
	⚠2124049055	PUSH (POWER) SWITCH 200V ~ 240V MULTI SPLY★	
	1038066002	PANEL ASSY	Surface
	1128038209	KNOB ASSY	Locate
	1128040103	KNOB	Anti-skate
7	4118040301	FRONT CHASSIS	
8	4128031009	SUPPORTER	
9	3998014008	LED ASSY	
	1138064001	PUSH BUTTON ASSY	STOP
	FPU-670	TONE ARM UNIT	
	2039616007	OUT PUT CORD	
	4018006102	HINGE	
10	FMD05241	INSULATOR	

Ref. No.	Part No.	Part Name	Remarks
	4418271003	C.B. BRACKET (A)	
	1468076028	DUST COVER ASSY	
	FTS0701	HINGE PLATE	
11	1018101819	CABINET ASSY 120V	
11	1018101822	CABINET ASSY 200V~240V	
11	1018101835	CABINET ASSY 200V ~ 240V	Black
11	1018101848	CABINET ASSY MULTI SPLY★	
	1058032003	BOTTOM PLATE 120V 200V ~ 240V	
	1058032016	BOTTOM PLATE MULTI SPLY★	
	1058023203	F. BOTTOM PLATE	Metal
	3158242005	SHELL ACCESSORY ASSY	
	FPU-555	HEAD SHELL UNIT	
12	KU-298	OPERATION PANEL UNIT	
13	KU-317	MOTOR SERVO AMP UNIT 120V	
13	KU-320	MOTOR SERVO AMP UNIT 200V~240V MULTI SPLY★	
14	KU-297	ARM DRIVE CONTROL	
15	KU-318	ARM SERVO UNIT 120V	
15	KU-321	ARM SERVO UNIT 200V ~ 240V MULTI SPLY★	
16	PS-141	POWER SUPPLY UNIT 200V ~ 240V MULTI SPLY★	
17	2123315007	VOLTAGE SELECTOR MULTI SPLY★	

Note: ★MULTI SPLY: 110V ~ 240V Switchable





Voltage Selctor Switch: 220V

Fig. 6 BOTTOM VIEW

(BOTTOM PLATE REMOVED)

EXPLODED VIEW (of Tonearm)

Ref. No.	Part No.	Part Name	Remark
1~5	3158232002	MAIN BODY ASS	
2	3158248009	GUIDE PIN ASS	
3	3158236202	SHAFT CASE	
4		3×3 CPS	
5	4744200003	3×3 BSS(A)	(×4)
6	3158220001	BALANCE WEIGHT ASS	
7~17	3158223011	ARM BASE ASS	
8	3158226005	LIFTER ARM ASS	
9	3158066003	STOP SCREW	
10	3158225103	ARM REST ASS	
11	4638092004	LIFTER SPRING	
12	3158229002	LIFTER SHAFT	
13	4761003009	3E RING	
14	4751005004	4W	
15	3158066003	STOP SCREW	
16	4744207013	4×8 BSS(A)	
17	3158230004	COVER PLATE	
18	4418231108	SHIELD COVER BASE ASS	
19		3×8 BOLT	

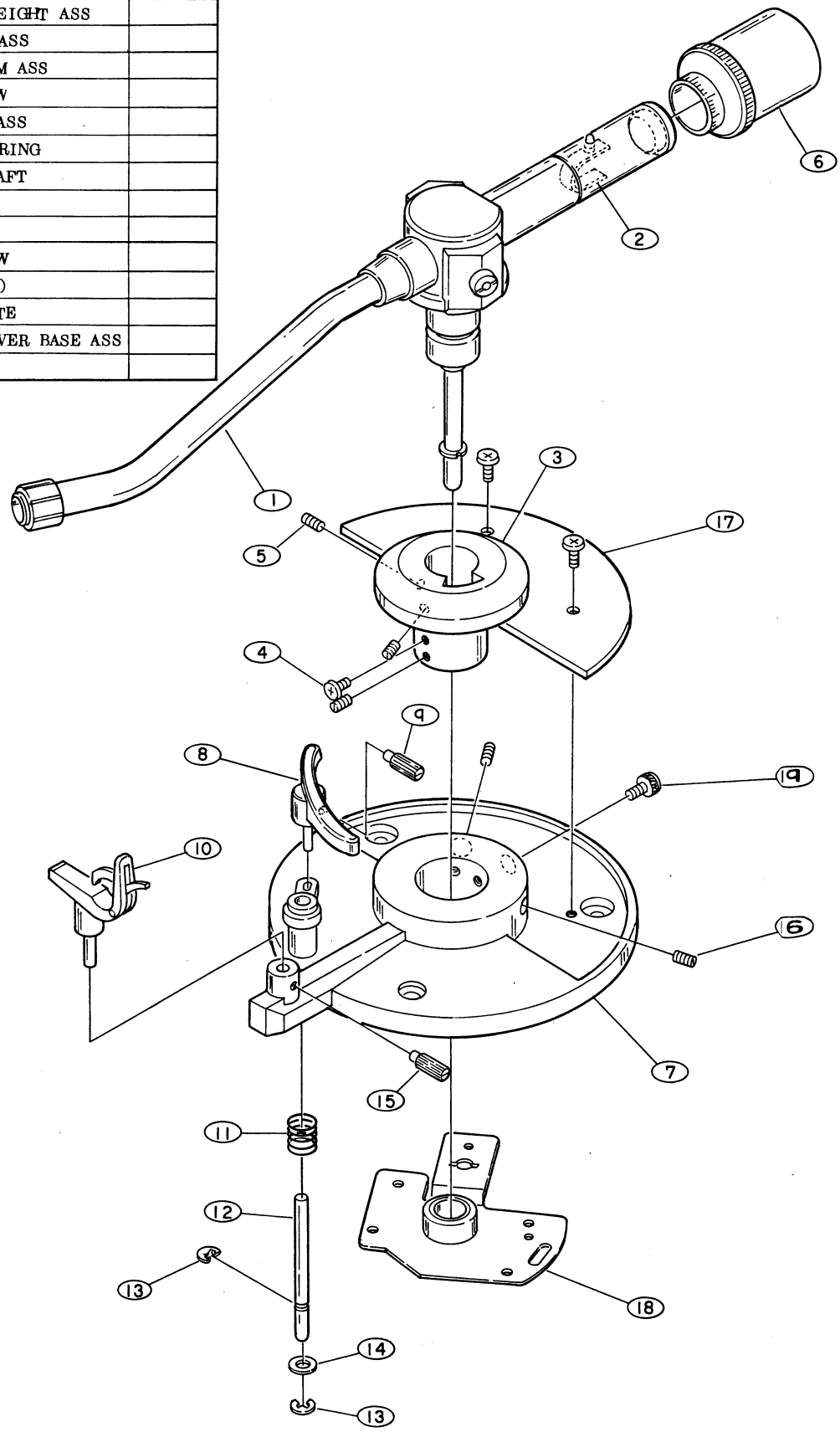


Fig. 7 TONEARM

EXPLODED VIEW (of Sensor)

Ref. No.	Part No.	Part Name	Remark
1	2178030201	MOTOR (B)	
2	4713303016	3×6 CBS	
3	2129018007	REED SWITCH	
4	4700009006	3×6 CPSW	
5	4128032105	REED SW BRACKET	
6	4730304014	3×8 CBRTS(1)	
7	4774003013	3×3 SS(A)	
8	4218121104	MOTOR ARM	
9	4761001001	2E-RING	
10	4418220106	CONNECTION PLATE	
11	4118030609	LIFTER CHASSIS ASS	
12	4713104011	2×8 CBS	
13	4761003009	3E RING	
14	4770090058	WASHER	
15	4248005407	SLIDER CAM	
16	2129064006	MICRO SWITCH	
17	4418221105	SWITCH BRACKET	
18	4318019608	DAMPER ASS	
19	4218122307	DAMPER ARM	
20	4713808005	23×10 CBS	

Ref. No.	Part No.	Part Name	Remark
21	2129053004	MICRO SWITCH	
22	4418273108	SWITCH SUPPORTER	
23	4498017300	POLARIZED PLATE(A)	
24	4338089100	SHUTTER	
25	3410009108	MAGNET	
26	2178029403	MOTOR(A)	
27	4148037407	SHIELD COVER	
28	4730308010	3×14 CBRTS(1)	
29	2228107204	MOTOR SERVO PCB 06A	
30	4418271003	CB BRACKET	
31	4713304015	3×8 CBS	
32	3939030009	CDS	
33	4418229204	CDS HOLDER	
34	4498018105	POLARIZED PLATE(B)	
35	4712303017	3×6 CFS	
36	4418228108	LED HOLDER	
37	3939023029	LED	
38	4730353010	3×6 CBRTS	
39	4148045004	SHUTTER COVER	

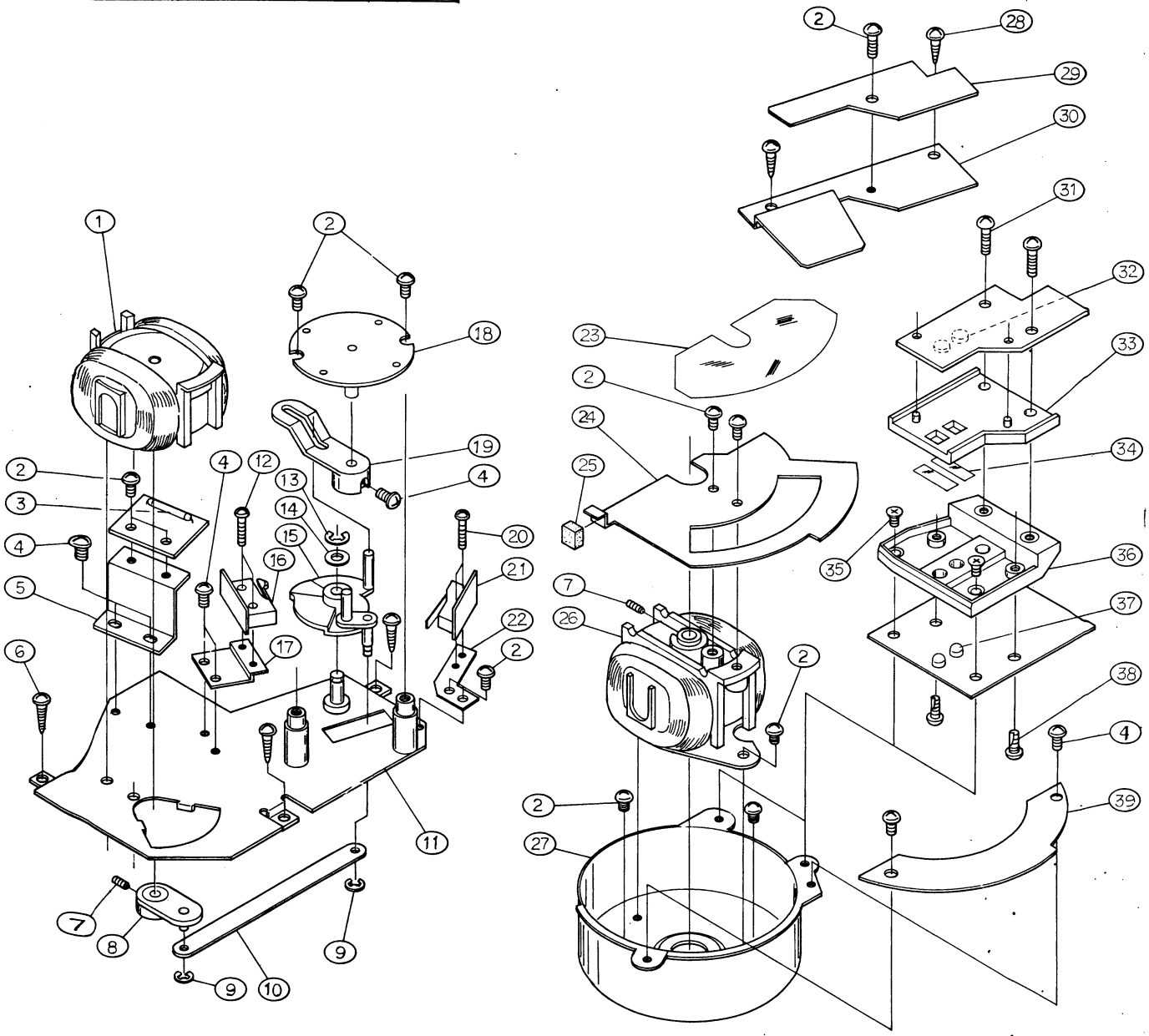
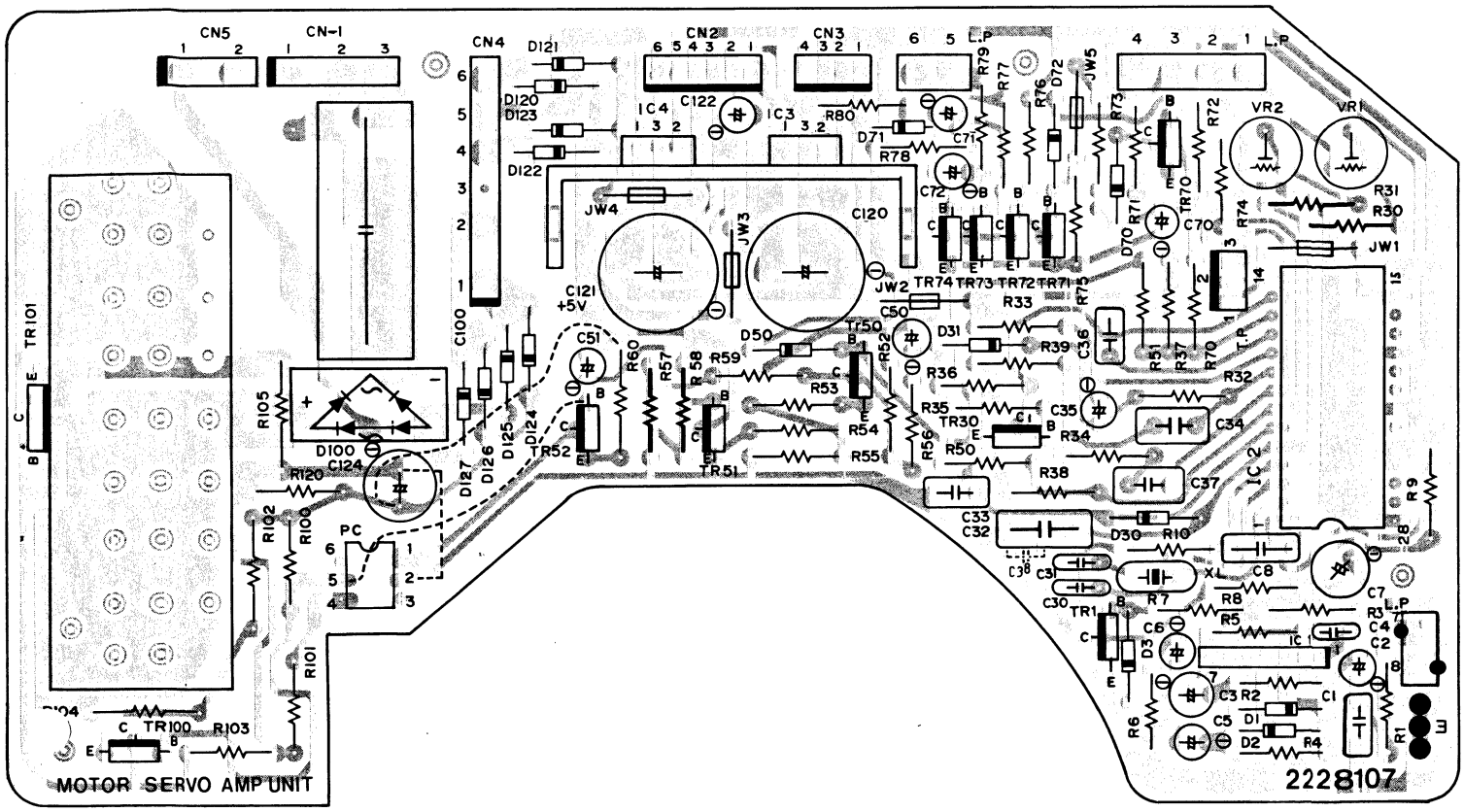


Fig. 8 SENSOR/ANGULAR CONTROL MOTORS

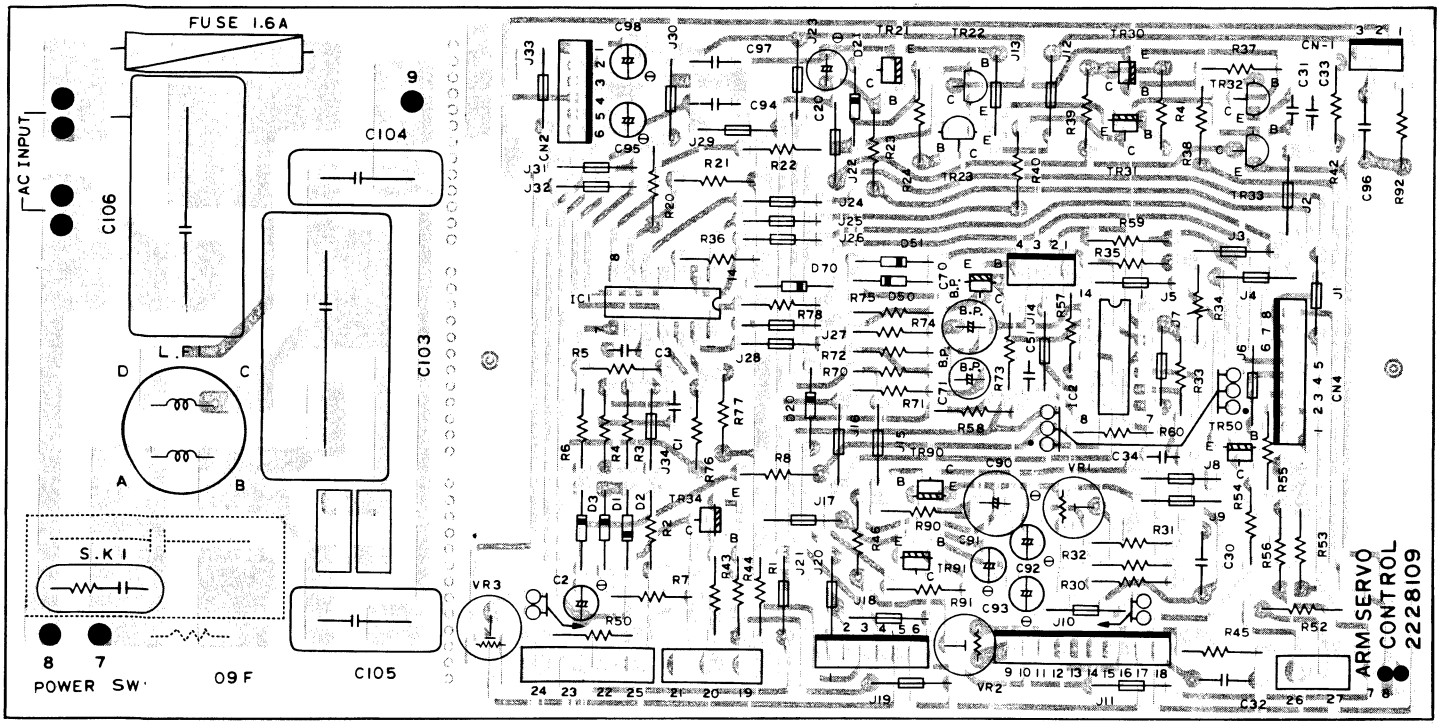


KU-317/KU-320 MOTOR AMP UNIT

Ref. No.	Part No.	Part Name	Remarks
SEMICONDUCTOR GROUP			
IC1	2630094028	TA7122BP (C)	
IC2	2620075002	SC3120A	
IC3	2680009005	FS-7805M	
IC4	2680017000	FS-7905M	
P.C.	3939027012	PC613 (G)	
TR1, 30, 50	2730021030	2SC458 (C)	
51, 70, 71,	↑	↑	
72, 73, 74	↑	↑	
TR52, 100	2710040028	2SA673 (C)	
TR101	2730196017	2SC2023	
D1, 2, 3, 30, 50, 70, 71	2760049008	1S2076	
D72	2760244007	MZ303A	
D100	2760213009	1S2372A	
D120, 121,	2760237001	RV06	
122,123,124,	↑	↑	
125,126,127	↑	↑	
RESISTOR GROUP			
R1, 6, 8, 50	2410330009	RD14B2E472J	4.7KΩ1/4W
R2, 7, 76	2410354001	RD14B2E473J	47KΩ1/4W
R3	2410362006	RD14B2E104J	100KΩ1/4W
R4	2410378003	RD14B2E474J	470KΩ1/4W
R5	2410308002	RD14B2E561J	560Ω1/4W
R9, 53, 54 56, 60	2410290000	RD14B2E101J	100Ω1/4W
R10, 36	2410338001	RD14B2E103J	10KΩ1/4W
R30*	FEP101110	RN1/4PS36KΩG	36KΩ2%1/4W Metal film
R31*	FEP101127	RN1/4PS24KΩG	24KΩ2%1/4W Metal film
R32	2410759004	RD14B2E564J	560KΩ1/4W
R33, 80	2410334005	RD14B2E682J	6.8KΩ1/4W
R34, 37, 120	2410326000	RD14B2E332J	3.3KΩ1/4W
R35, 52, 75, 79	2410342000	RD14B2E153J	15KΩ1/4W
R38, 55, 71	2410322004	RD14B2E222J	2.2KΩ1/4W
R39	2410328008	RD14B2E392J	3.9KΩ1/4W
R51, 78	2410366002	RD14B2E154J	150KΩ1/4W
R57*	FEP101138	RN1/4PS8.2KΩG	8.2KΩ2%1/4W Metal film
R58*	FEP101122	RN1/4PS24KΩG	24KΩ2%1/4W Metal film
R59	2410314009	RD14B2E102J	100KΩ1/4W
R70, 73, 74	2410346006	RD14B2E223J	22KΩ1/4W
R72	2410372009	RD14B2E274J	270KΩ1/4W
R77, 103	2410306004	RD14B2E471J	470Ω1/4W
R100	2410304006	RD14B2E391J	390Ω1/4W
R101	2410296004	RD14B2E181J	180Ω1/4W
R102	2410161003	RD14B2H101J	100Ω1/4W
R104	2410348004	RD14B2E272J	2.7KΩ1/4W
R105	2440013024	RS14B3A4R7JNBF	4.7Ω1W Metal oxide
	EP-5462-14	SOLID VOLUME (15KΩ)	
	EP-5462-15	SOLID VOLUME (22KΩ)	

Ref. No.	Part No.	Part Name	Remarks
CAPACITOR GROUP			
C1	2551076002	CQ93M1H223K	0.022μF50V
C2, 50	2544043000	CE04W1HR47=	0.47μF50V
C3	2544017007	CE04W1C470=	47μF16V
C4, 30, 31	2533619005	CC45SL1H470J	47pF5%50V
C5,6,35,122	2544015009	CE04W1C100=	10μF16V
C7	2544010004	CE04W1A101=	100μF10V
C8	2551066009	CQ93M1H332K	0.0033μF50V
C32	2551122011	CQ93M1H563J	0.056μF5%50V
C33, 37	2551070008	CQ93M1H682K	0.0068μF50V
C34	2551121038	CQ93M1H123J	0 012μF5%50V
C36	2551062003	CQ93M1H152K	0.0015μF50V
R51, 70	2544023004	CE04W1E3R3=	3 3μF25V
C71*	2549009010	CE04W1H010MHS	1μF20%50V Low leakage Current
C72*	2549005030	CE04W1E100MHS	10μF20%50V Low leakage
C100	2568013058	CF99=2DAC405J	4μF200VAC Metalized film
C120	2544022005	CE04W1C102=	1000μF16V
C121	2544031009	CE04W1E471=	470μF25V
C124	2544018006	CE04W1C101=	100μF16V
OTHER PARTS GROUP			
	4178020413	HEAT SINK for Power Transistor	
	4178028004	HEAT SINK for Voltage Regulator	
	2618007008	CRYSTAL (9MHZ)	
	2035622008	3P MIN. CONNE. PIN. for Test Point	
	FEP12802	MINI. CONNE. PIN. ASSY for Motor	

NOTE:
1. Parts with * marks should be replaced with specified components. (Temperature compensating devices)

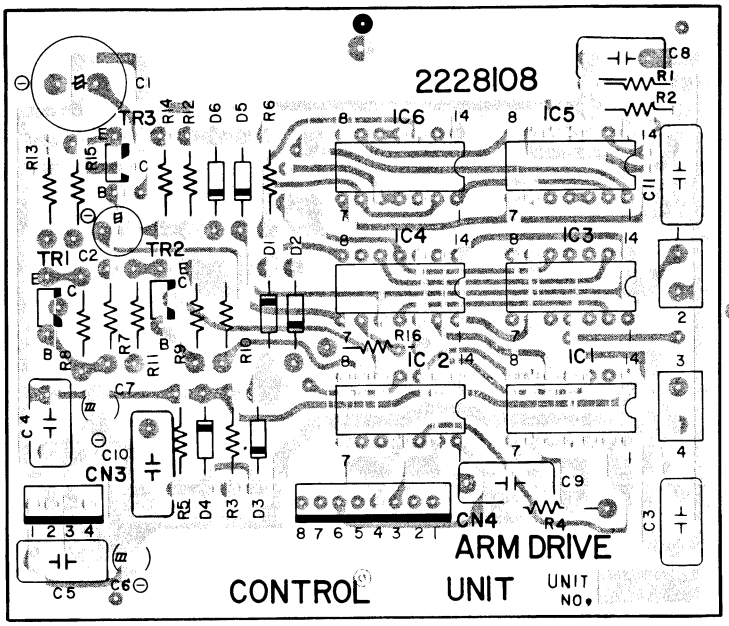


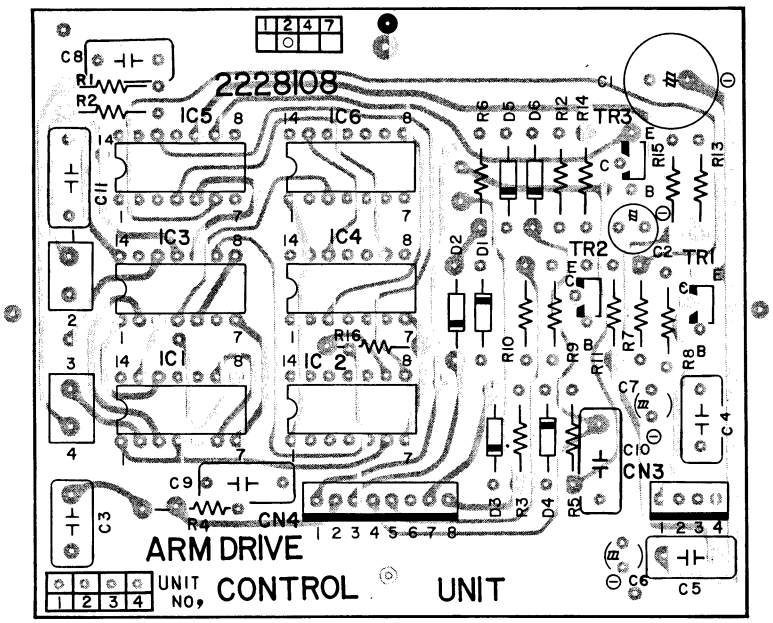
KU-318/KU-321 ARM SERVO CONTROL UNIT

Ref. No.	Part No.	Part Name	Remarks
SEMI CONDUCTOR GROUP			
IC1, IC2	2630075005	HA17902P	
TR21, TR31, TR70, TR90	2730021030	2SC458©	
TR22, TR32	2740036002	2SD468©	
TR23, TR33	2720025004	2SB562©	
TR30, TR50, TR91	2710040028	2SA673©	
TR34	2740038000	2SD467©	
D1 ~ 3 D20, D21	2760049008	1S2076	
D50, D51	2760216019	KB265	
D70	2760241000	MZ305B or HZ5B	
RESISTOR GROUP			
R1	2410316007	RD14B2E122J	1.2KΩ 1/4W
R2, R50, R52 R53, R74	2410332007	RD14B2E562J	5.6KΩ 1/4W
R3	2410358007	RD14B2E683J	68KΩ 1/4W
R4, R56, R76	2410330009	RD14B2E472J	4.7KΩ 1/4W
R5, R33	2410765001	RD14B2E105J	1MΩ 1/4W
R6, R41	2410306004	RD14B2E471J	470Ω 1/4W
R7, R20, R23, R34, R36, R73	2410338001	RD14B2E103J	10KΩ 1/4W
R8, R43, R59, R90	2410314009	RD14B2E102J	1KΩ 1/4W
R21, R78	2410322004	RD14B2E222J	2.2KΩ 1/4W
R22, R40	2410302008	RD14B2E331J	330Ω 1/4W
R24	2440020020	RS14B3A180JNBF	18Ω 1W
R30	2410763003	RD14B2E824J	820KΩ 1/4W
R31	2410352003	RD14B2E393J	39KΩ 1/4W
R32	2410320006	RD14B2E182J	1.8KΩ 1/4W
R35	2410348004	RD14B2E273J	27KΩ 1/4W
R37, R38, R72, R91	2410346006	RD14B2E223J	22KΩ 1/4W
R39, R54	2410342000	RD14B2E153J	15KΩ 1/4W
R42, R57	2410362006	RD14B2E104J	100KΩ 1/4W
R44	2410288009	RD14B2E820J	82Ω 1/4W
R45, R92	2410290000	RD14B2E101J	100Ω 1/4W
R46	2410286001	RD14B2E680J	68Ω 1/4W
R55	2410354001	RD14B2E473J	47KΩ 1/4W
R58	2410374007	RD14B2E334J	330KΩ 1/4W

Ref. No.	Part No.	Part Name	Remarks
R70	241032008	RD14B2E392J	3.9KΩ 1/4W
R71	2410334005	RD14B2E682J	6.8KΩ 1/4W
R75	2410370001	RD14B2E224J	220KΩ 1/4W
R77	2410298002	RD14B2E221J	220Ω 1/4W
VR1	EP-546215	SOLID VOLUME	
VR2	EP-54621	SOLID VOLUME	
VR3	EP-546213	SOLID VOLUME	
CAPACITOR GROUP			
C1	2551066009	CQ93M1H332K	0.0033μF 50V
C2	2544054002	CE04W1C220=	22μF 16V
C3	2531021006	CK45F1M102	100pF 50V
C20	2544005006	CE04W0J331=	330μF 6.3V
C31	2551072006	CQ93M1H103K	0.01μF 50V
C32, C96	2531027000	CK45F1H104Z	0.1μF 50V
C34	2533637003	CC45SL1H271	270pF 50V
C35	2533633007	CC45SL1H181	180pF 50V
C51	2533657009	CC45SL1H101K	100pF 50V
C70, C71	2543014027	CE04D1C100BP	10μF 16V Bipolar
C90	2544006005	CE04W0J471=	470μF 6.3V
C91	2544010004	CE04W1A101=	100μF 10V
C92, C93	2544044009	CE04W1H010=	1μF 50V
C94	2531026001	CK45F1H473Z	47000pF 50V
C95	2544015009	CE04W1C100=	10μF 16V
OTHER PARTS GROUP			
CDS1, CDS2	3939030009	CDS	
LED1, LED2	3939023929	LED (SEL101S)	
SW1	2129018007	REED SWITCH	
SW2	2129090009	MICRO SWITCH	
SW3	2129053004	MICRO SWITCH	
120V MODELS (KU-318) ONLY			
R100	2410292008	RD14B2E121J	120Ω 1/4W
⚠ C103, C106	2568017012	CF99B2BAC104MW	0.1μF 125VAC
⚠ C104, C105	2568017019	CF99B2BAC102MW	0.001μF 125VAC
⚠ SK1	FEP-429H	SPARK KILLER	
⚠	2398001007	LINE FILTER COIL	
⚠ F100	2061018039	FUSE	(1.6A 250V)

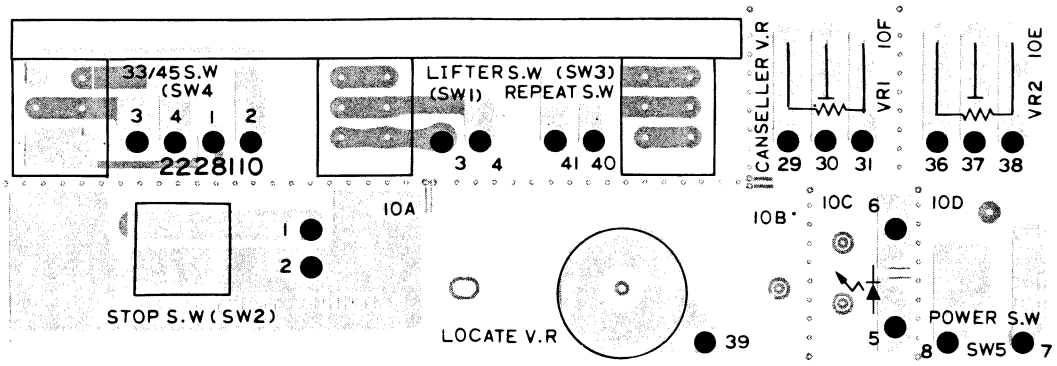
WARNING:
⚠ Components with ⚠ marks and shading have special characteristics important to safety.
They must be replaced only by specified components.





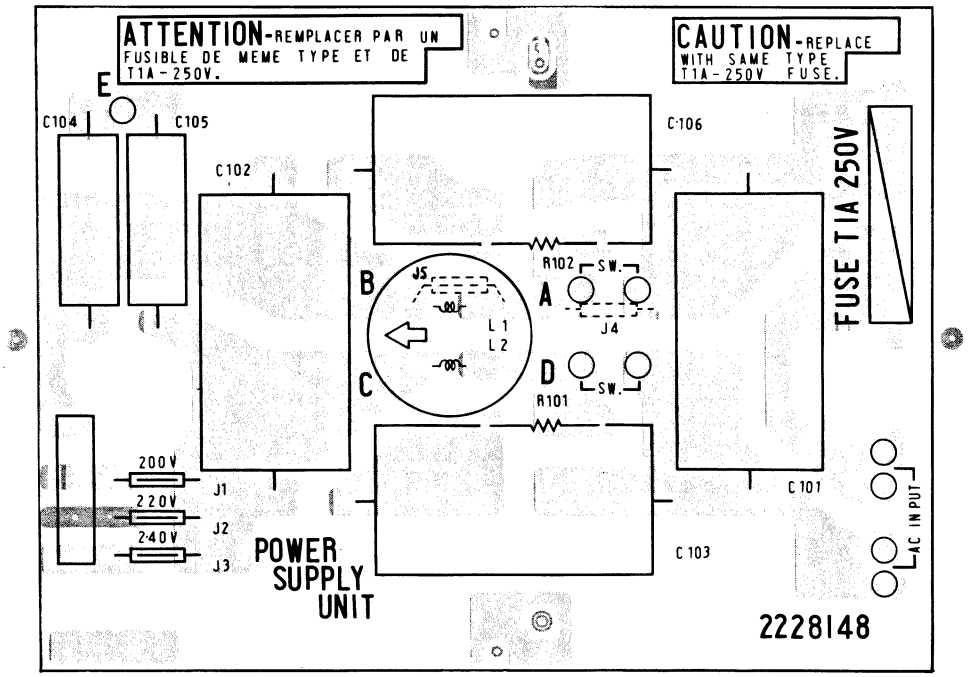
KU-297 ARM DRIVE CONTROL UNIT

Ref. No.	Part No.	Part Name	Remarks
SEMI CONDUCTOR GROUP			
IC1	2620076001	HD7410	
IC2	2620082008	HD7432	
IC3, 5, 6	2620056005	HD7400P	
IC4	2620080000	HD7404	
TR1, 2, 3	2730021030	2SC458 (C)	
D1 ~ 6	2760049008	1S2076	
RESISTOR GROUP			
R1, 2, 6, 9	2410322004	RD14B2E222J	2.2KΩ1/4W
R3, 15	2410314009	RD14B2E102J	1KΩ1/4W
R4, 10	2410306004	RD14B2E471J	470Ω1/4W
R5	2410338001	RD14B2E103J	10KΩ1/4W
R7, 11	2410326000	RD14B2E332J	33KΩ1/4W
R8	2410332007	RD14B2E562J	5.6KΩ1/4W
R12	2410290000	RD14B2E101J	100Ω1/4W
R13, 14	2410346006	RD14B2E223J	22KΩ1/4W
R16	241316007	RD14B2E122J	1.2KΩ1/4W
CAPACITOR GROUP			
C1	2544006005	CE04W0J471	470μF6.3V
C2	2544010004	CE04W1A101	100μF10V
C3, 4, 5	2531026001	CK45F1H473Z	0.047μF50V
C6	2544015009	CE04W1C100	10μF16V
C9, 10, 11	2531027000	CK45F1H104Z	0.1μF50V



KU-298 CONTROL PANEL

Ref. No.	Part No.	Part Name	Remarks
RESISTOR GROUP			
VR1, 2	2118024015	V16V20KB502	5KΩB
OTHER PARTS GROUP			
SW1, 3, 4	2129058009	PUSH SWITCH (REPEAT, LIFTER, 33/45)	
SW2	2129059008	PUSH SWITCH (STOP)	



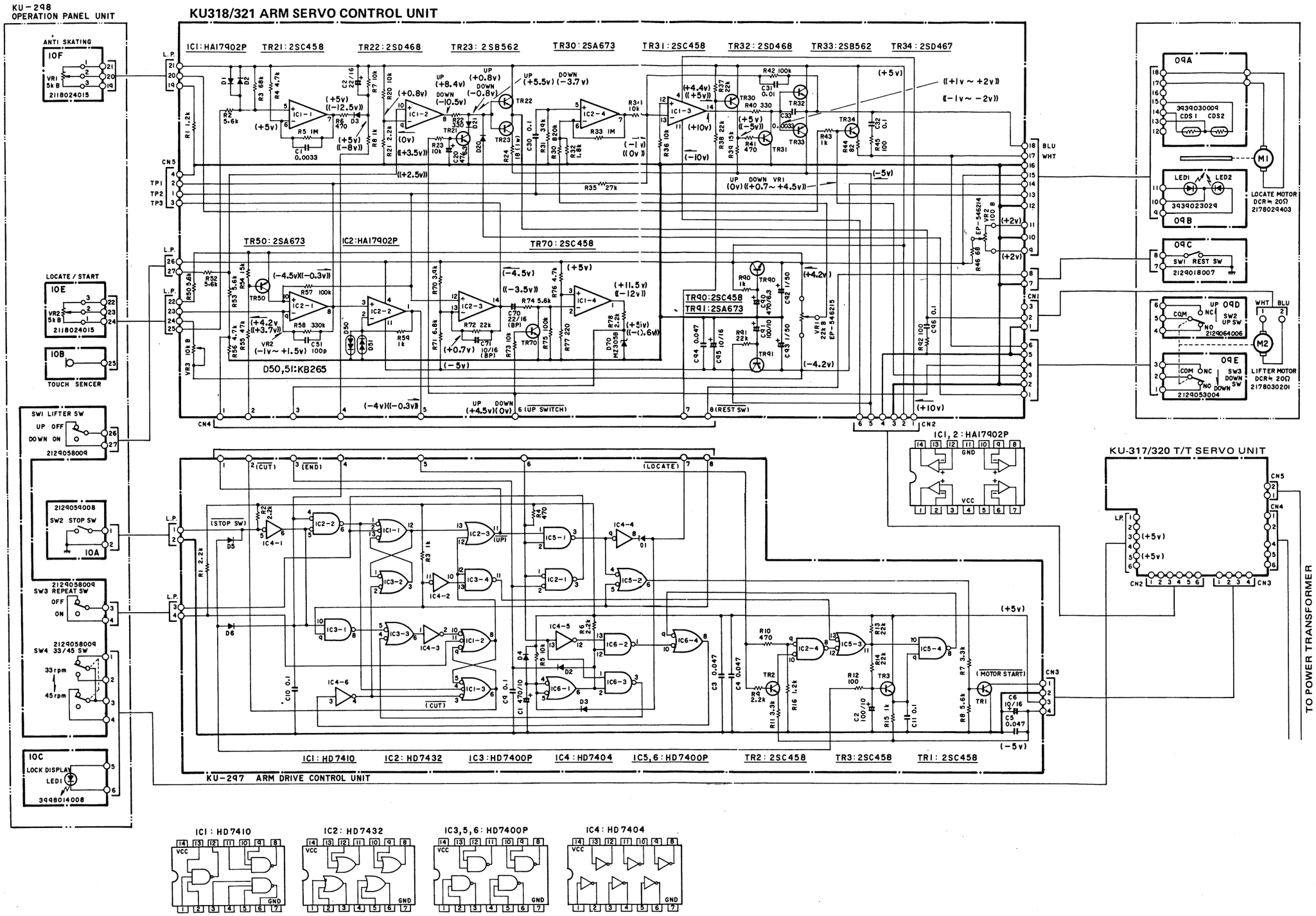
PS141-POWER SUPPLY UNIT (200 ~ 240V models only)

⚠PS-141 POWER SUPPLY UNIT

Ref. No.	Part No.	Part Name	Remarks
RESISTOR GROUP			
R101 (102)	2410163001	RD14B2H121J	120Ω1/2W
CAPACITOR GROUP			
⚠C101,102	2518001036	CP05C==AC104M	0.1μF450VAC
⚠C103,(106)	2518001023	CP05C==AC473M	0.047μF450VAC
⚠C104,105	2518001049	CP05C==AC102M	0.001μF450VAC
OTHER PARTS GROUP			
	⚠2061015029	FUSE	(T1A, 250V)
	FEP1287	FUSE HOLDER	
	⚠2398001007	LINE FILTER COIL	

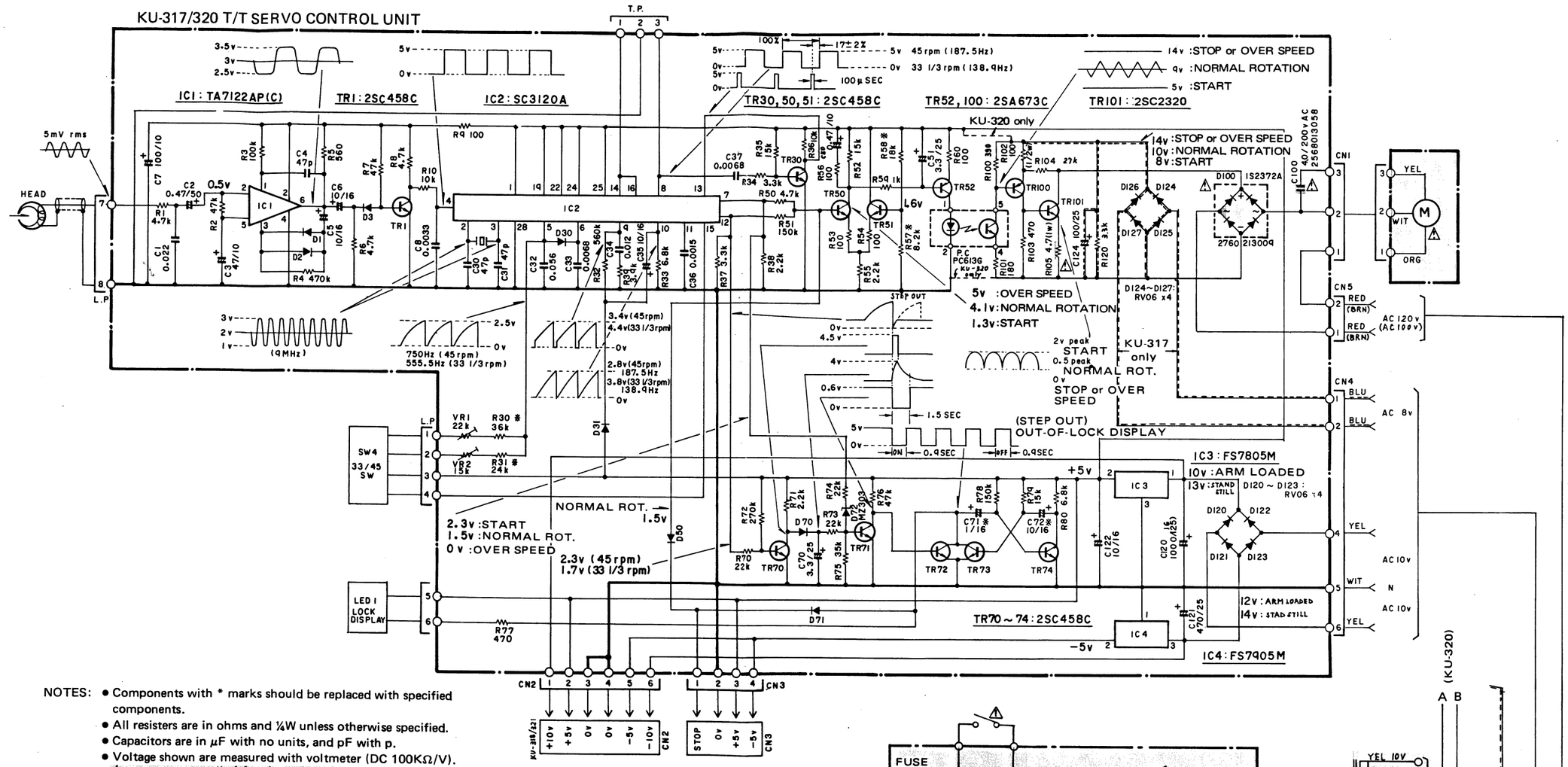
★ Fuse for MULTI SPLY is⚠2061015058 FUSE (T1.6A 250V).

SCHEMATIC DIAGRAM OF TONEARM SERVO CONTROL OF MODEL DP-40F

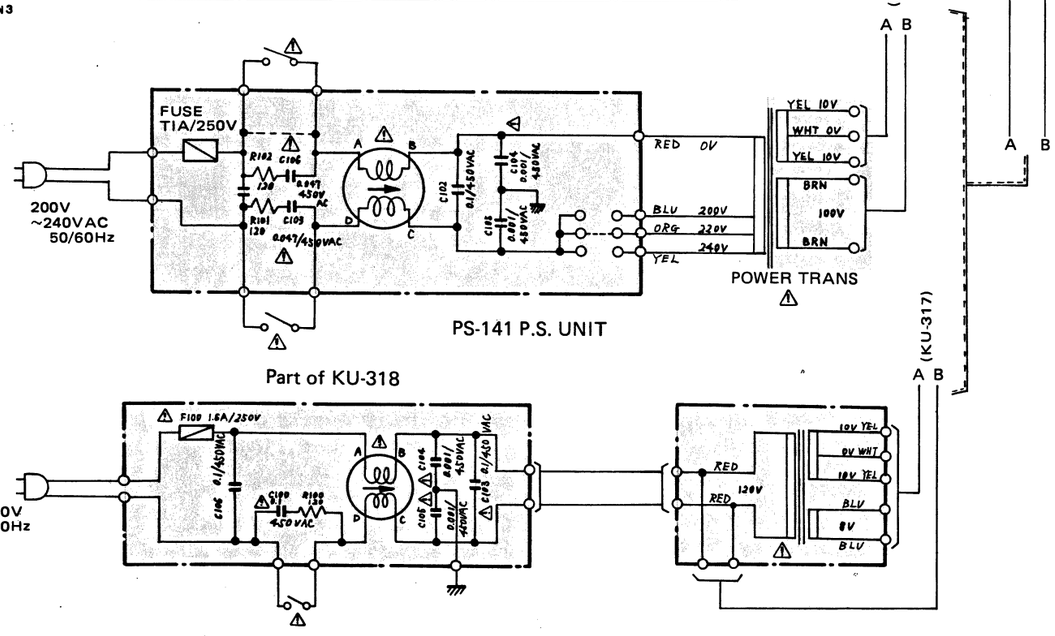


NOTES:
- ALL RESISTORS ARE IN OHMS AND ¼W UNLESS OTHERWISE SPECIFIED.
- CAPACITORS ARE IN μF WITH NO UNIT, AND pF WITH P.
- VOLTAGES IN ( ) ARE AT STAND-BY AND (( )) ARE AT FUNCTION. MEASURED WITH VOLTMETER (DC 100kΩ/V).
- ALL DIODES UNLESS OTHERWISE SPECIFIED ARE IS2076
- L.P. INDICATES WIRE WRAPPING CONNECTIONS.
- ⚠ COMPONENTS WITH ⚠ MARKS AND SHADING HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. THEY MUST BE REPLACED ONLY BY SPECIFIED COMPONENTS.
- * SCHEMATIC DIAGRAM SHOWS A BASIC CIRCUIT. IT IS SUBJECT TO MODIFICATION FOR IMPROVEMENT.

SCHEMATIC DIAGRAM OF TURNTABLE SERVO CONTROL OF MODEL DP-40F



NOTES:
- Components with * marks should be replaced with specified components.
- All resisters are in ohms and ¼W unless otherwise specified.
- Capacitors are in μF with no units, and pF with p.
- Voltage shown are measured with voltmeter (DC 100KΩ/V).
- ⚠ Components with ⚠ marks and shading have special characteristics important to safety. They must be replaced only by specified components.
- All transistors unless otherwise specified are; 2SC458C for NPN and 2SA673C for PNP.
- All diodes unless otherwise specified are 1S2076.



SPECIFICATION

PHONO MOTOR

Drive system:	Direct drive by AC servo motor
Speeds:	33-1/3 rpm and 45 rpm
Wow/Flutter:	0.015% wrms*
S/N ratio:	More than 75 dB (DIN-B)
Rise time:	Less than 2.0 sec. to reach 33-1/3 rpm.
Platter:	Casted aluminum, 300 mm diam.
Motor:	AC servo motor
Speed control system:	Speed servo control by frequency detection system combined with phase control system with reference to the quartz crystal oscillator
Load infection:	0% (At out-most groove with stylus force of 80 g)
Speed deviation:	Less than 0.002%

TONEARM

Type:	S-shaped, static balance type with damping system
Automatic mechanism:	Electronically servo controlled
Effective length:	244 mm
Stylus force range:	0–2.5 g/rotation, 0.1 g direct reading
Acceptable weight of cartridge:	15 g–21 g (including shell)
Head shell:	Impact molded rigid light metal, 9 g (net)
Output cord:	Low capacitance cord

GENERAL

Power supply:	Rated voltage and frequency are shown on rating label at back of cabinet and/or the label attached to the AC cord.
Power consumption:	18 W
Dimensions:	485(W) x 447(D) x 146(H) (mm), dust cover closed
Weight:	Approx. 12.5 Kg

* Measured by DENON's method using magnetic pulse wheel.

** Above specifications are subject to alteration without notice.

Dimensions (mm)